A Novel Method for the Removal of Trace Concentrations of Elemental Mercury From Utility Emissions

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Abstract

A new technique for removal of elemental mercury from emissions of coal-fired utilities is being investigated. The key idea is to selectively photoionize the mercury atoms. A strong electric field gradient then drags them the negative plate. Studies have shown that it is possible to selectively photoionize elemental mercury. One photoionization scheme involves resonant absorption of three photons, the first resonant absorption is at 253.65 nm. This long lived excitation is followed by the resonant absorption of a 436 nm photon. The absorption of another 436nm photon causes ionization. The other possible scheme begins the same way, i.e., the resonant absorption of a 253.65 nm photon. This is followed by the resonant absorption of a 313 nm photon obtained from a frequency doubled 626nm tunable laser. The subsequent absorption of a 626 nm photon causes ionization. Calculations will be presented which show that this indeed is likely to be a feasible and practical process.